# BUTTERFLIES OF NEBRASKA

LEXINGTON MIDDLE SCHOOL  ROOM 210  PERIOD 3

# WHY BUTTERFLIES

Why would butterflies affect you? Butterflies are more than just pretty little decorations, they play a huge role in our ecosystem. When it comes to flying across America, it takes a real butterfly to do that. Butterflies may be very small, but they're quite mighty when it comes to surviving. It might seem as if they are just **insects**, but they actually help us and our ecosystem too. To kick things off, one reason why we chose to study butterflies is because they are becoming extinct, extremely fast. We believe one reason there are less butterflies in the world is because farmers and ranchers use pesticides on their crops and plants. **Lepidopterist** who study moths and butterflies; are trying to learn how and why the number of butterflies are decreasing. Butterflies are also an indicator of a good or bad ecosystem. Not only are butterflies an indicator of a habitat, but they are also an important element of the food system and food chain. Their main source of food is nectar from flowers but they also eat tree sap, dung, **pollen**, and rotting fruit. This is known as the process of pollination, butterflies help themselves and the plant by transferring pollen from one flower to another. Butterflies receive a sugary liquid then the plant reproduces. There are also other ways to pollinate, such as **self-pollination**, hand-pollination, and cross-pollination. Cross Pollination is natural and without butterflies and bees we would be stuck pollinating flowers, fruits, vegetables and other plants with our hands. In addition, the design of butterflies is sometimes used to create tiny spying cameras for Government purposes. There are many ways we can help them crawl out of extinction, which you will find out about while reading this book. Butterflies may not seem that interesting, but they are rather fascinating.

1

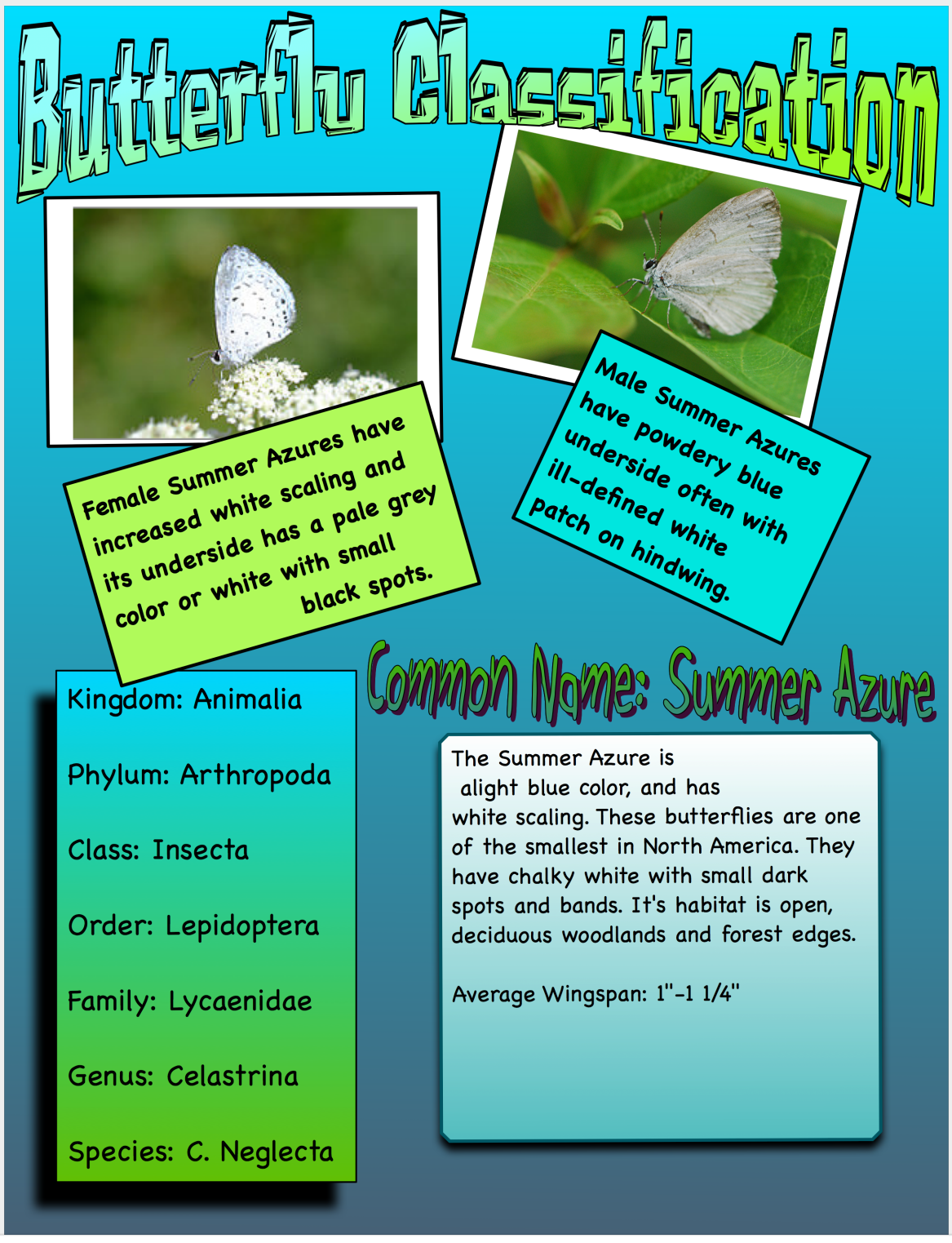
# CLASSIFICATION

The first way to classify a butterfly is a **dichotomous key**. Most people use this method because it seems easier, but it actually takes a larger amount of time. Dichotomous key is when you have two different types of butterflies (or living organisms). By using the key you look at similarities and differences of the body parts, such as the legs, **thorax**, or wings. Then Lepidopterist check if they have a wide thorax or a skinny thorax. This key will then help narrow the choices of organisms until you find the specific name for the organism you are observing.

The process scientist use to assign names to organisms is called **binomial nomenclature**. To name organisms scientist classify them into categories based on shared similarities which is called **taxonomy**. There are several levels in classification, the largest level is kingdom which is followed by a smaller level called a phylum. The next levels are class, order, **family**, **genus** and **species**. The scientific name for an organism consists of its *Genus species* name. The scientific name for a Monarch butterfly is *Danaus plexippus*.

To classify a butterfly using a dichotomous key, with pictures is the easiest method if you're just beginning to learn about butterfly classification.

*Butterfly Classification*



2

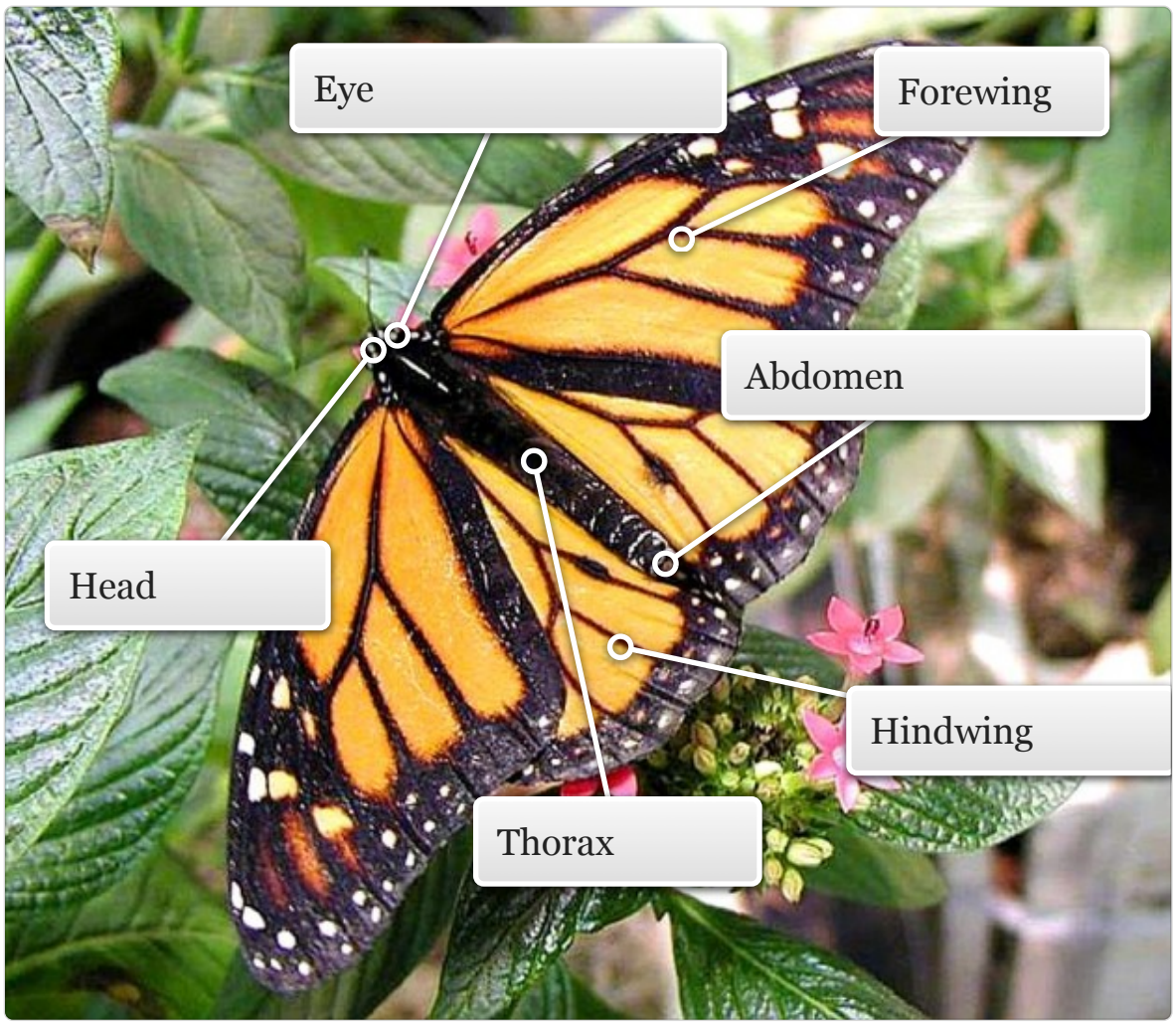
# ANATOMY

To begin, even though butterflies and moths seem alike in a lot of ways they are truly different. You can distinguish butterflies by looking at the physical features that are different compared to moths.

As a matter of fact, moths and butterflies are different colors and also have different antennas, wings, stance, diets, pupas and their activity is also different. Although some people may think butterflies are **arachnids**, butterflies and moths are both arthropods.

One of the differences between butterflies and moths is color. To begin, the colors of butterflies' are bright and happy, while the colors of moths are dull and sad. In addition, there are a small amount of moths who have vibrant colors. Most moth's colors are lifeless. Many people can tell the difference between a moth and a butterfly by looking at their color.

**INTERACTIVE 2.1** Butterfly Anatomy




Another difference between butterflies and moths is their **antenna**. A moth's antennae is very hairy while a butterfly's antennae isn't. Also, butterflies have an antennae club at the end of their antennae and moths do not have an antennae club at all.

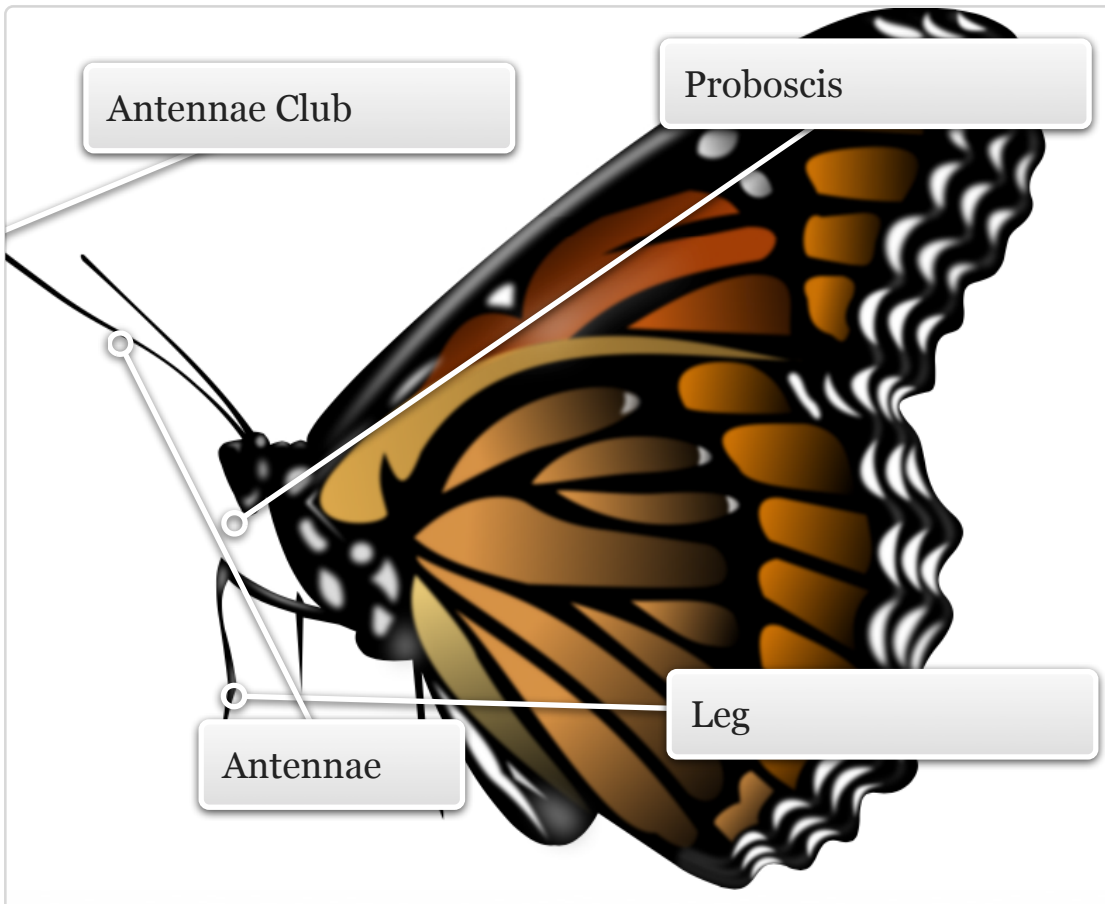
When you are trying to find the gender of a butterfly you can look at the hindwing and forewing because a male and a female have different designs. Many butterfly wings are full of designs, while most moths wings have little to no designs. We also looked at the different parts of a butterfly, like the **head**, **abdomen**, antennae, their **forewings** and **hindwings** so that we could be positive that the butterfly was a male or a female.

**INTERACTIVE 2.3** Spot the Difference between Butterflies and Moths

*Spot the difference between the first butterfly and the last moth, there are three differences in total.*

Additionally, another difference between butterflies and moths is their resting stance. At rest, moths usually hold their wings down and butterflies' wings are up. Furthermore, butterflies drink lots of nectar for food. Moths also drink nectar, but they eat many other things such as rotting food, tree sap, bird droppings, among other things. Another difference between a butterfly and a moth is the color of their pupa, or chrysalis. The chrysalis of a butterfly is green and smooth, while the color of a moth's chrysalis is reddish brownish and has a few bumps. In addition, when they are in the pupa stage, the butterflies' chrysalis are attached to a tree branch but moths' chrysalis are laid on the ground.

**INTERACTIVE 2.2** Butterfly Analogy




Butterflies are mostly active during the day, which means that butterflies are called diurnal. Most moths are nocturnal, which means that they are active during the night.

Last but not least, moths and butterflies all have a compound eye. A compound eye has multiple lenses and is only found on arthropods.

As you can see, there are many ways you can tell the difference between a butterfly and a moth.

3

# LIFE CYCLE OF A BUTTERFLY

As you should know, the magnificent butterfly goes through stages to become its lovely self. There are four stages in the butterfly life cycle. These four stages consist of the egg, larvae, chrysalis, and, of course, the beautiful butterfly.

The first stage of the life cycle is the egg. A female butterfly can lay up to about 100 eggs per day. The egg of the butterfly is about the size of a pin head. The eggs can be laid during either summer, spring, or fall. It really depends the species of the

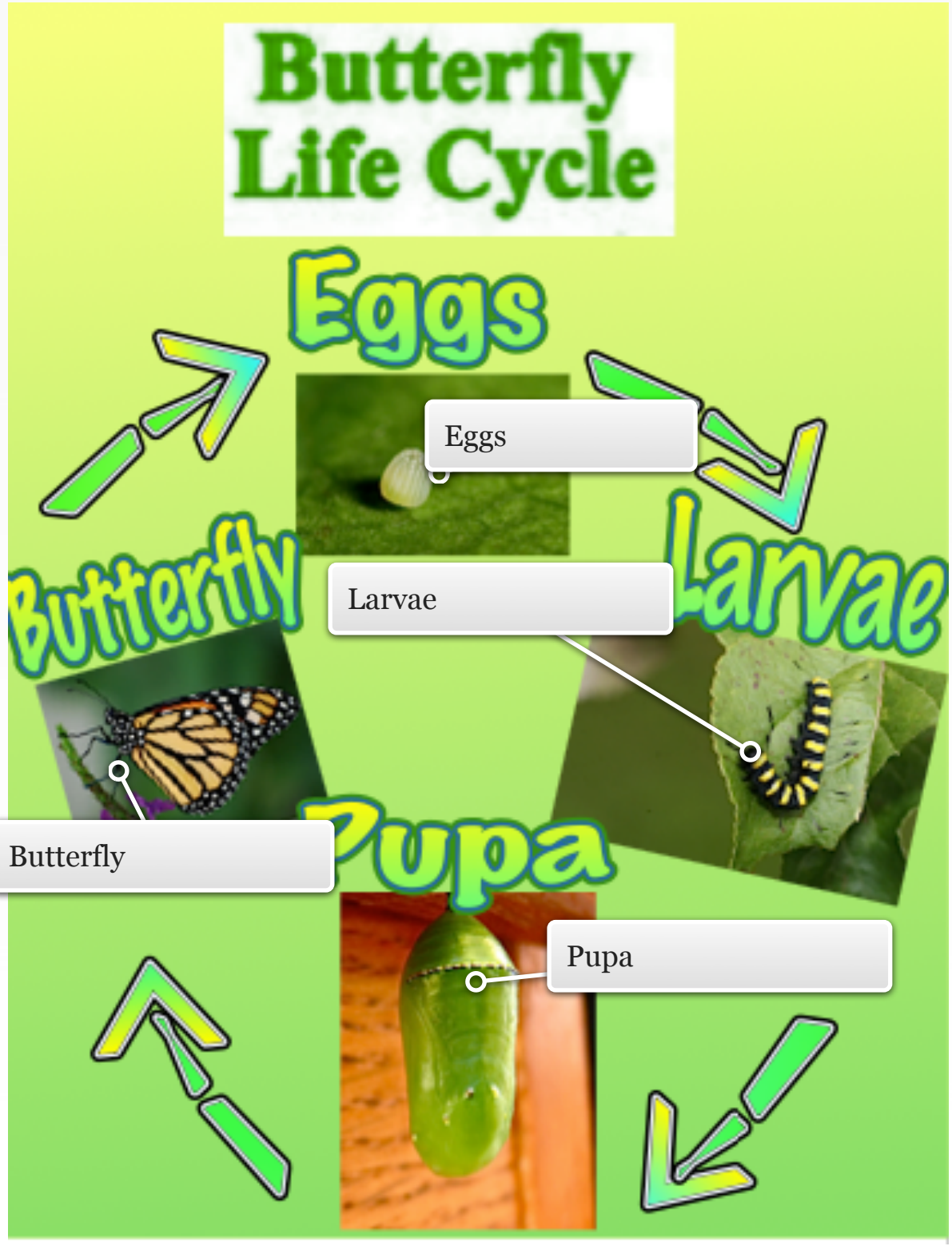
butterfly. The female butterfly also lays her eggs on milkweed. Some eggs barely survive this stage because other creatures try to eat them while they are laying their eggs. The eggs usually take 7 to 10 days them to transform into a caterpillar When the small baby caterpillar hatchling comes out of its egg, the first thing it eats is the shell of its own egg.

The second stage of the life cycle process is the caterpillar, also known as the larva. This stage can usually take 2-3 weeks. This is the longest life stage in the life cycle.  The larva can be many colors, but it all depends on the species of the butterfly. Some caterpillars can even be poisonous! The caterpillar can eat lots and lots of leaves and will never get full. In just two weeks, the caterpillar will shed its skin about five times!

The third stage of the cycle is called the chrysalis also known as the pupa. This stage usually lasts about ten to fourteen days. The butterfly does not eat during this stage. This stage is fascinating because you can actually see the butterfly through the chrysalis because the chrysalis is actually clear. You can find the chrysalis of butterflies on tree branches and on the leaves of trees. The chrysalis of many butterflies are suspended from a silk pad and abdominal hooks. Others have a silk girdle supporting their midsection. About a day before the adult butterfly emerges, the chrysalis of many species becomes transparent.

Finally, the last stage is the actual adult butterfly. Once the butterfly crawls out of the chrysalis it has to wait for a few hours to begin to fly, because its wings are wet. They are flying insects, they have six jointed legs, three body parts, a pair of antennae, compound eyes, and a exoskeleton. The butterfly body is covered by tiny sensory hairs. The four wings and the six legs are attached to the thorax. The thorax contains the muscles that make the legs and wings move. Also butterflies drink nectar from many flowers or sometimes get together with other butterflies and drink from a puddle. Finally the survival rate of a butterfly is about two to five percent. Butterflies are primary consumers, and because of this they provide food to many predators which feed on them. Those are all the stages of the Butterfly Life Cycle.

**INTERACTIVE 3.1** Butterfly Life Cycle



# 4

# POLLINATORS

Butterflies all over the world pollinate because it's their job. In this chapter you will be learning about flower anatomy and how butterflies pollinate. You will get to learn every part of the flower and it's job. Flower anatomy isn't just about learning the parts of the flower but also how butterflies pollinate. Pollination is a very important part of our food system, without it we wouldn't have most of the food we enjoy and love today; like fruit and honey, and decorative flowers. Butterflies are very active during the day, so they pollinate many flowers. Butterflies pollinate by going to

a flower and collects nectar. While collecting their nectar, pollen sticks to the butterfly. The butterfly goes to another flower and then the pollen falls into the flower that they land on. That's how butterflies help pollinate many beautiful flowers, and makes them ripe, sweet and ready to eat.

The butterflies have little taste buds on their feet that they use as a pre-taste. For example: A Monarch butterfly is flying around, and it lands on a flower; its feet lets it know if it's going to have some good nectar or not. I wouldn't want to be a butterfly because then I'd be tasting my socks all day!

Flowers can self-pollinate, cross pollinate, and hand pollinate. Self pollination is when pollen falls from one plant's stigma to the stigma of another plant. Wind sometimes helps with this. **Cross pollination** involves bees and butterflies. Cross **pollination** happens when butterflies (or bees) distribute pollen from one plant's stigma to another plant's stigma. Cross pollination creates more **diversity** than self pollination. Butterflies enjoy doing this, because they get nectar, which is one of their main food sources. Plants benefit from pollinators because the movement of pollen allows them to reproduce by setting seeds. However, pollinators don't know or care about the plant benefits. They pollinate to get nectar and pollen from flowers to meet their energy requirements and to produce offsprings.

**MOVIE 4.1** Flower Anatomy Activity

In the economy of nature, the pollinators provide an important service to flowering plants, while the plants pay with food for the pollinators and their offspring; that is pollination. Now let me tell you about the parts of the flower. There are male and female parts of the flower. The male part of the flower includes the **anther** and the filament. The female part is the ovary, **style**, and stigma. The ovary of a flower produces the eggs and will become the seed. The **stamen** elevates the **stigma** so that the stigma can easily collect pollen. The **pistil** is the female part of the flower, while the anther is the male part of the flower. The style elevates the anthers of a flower. Yet one of the most important parts is the petals. The petals attract pollinators by using scent and appearance. One study shows it is probably “some kind of scent or marking” that attracts a butterfly to come to the flower.

As you can see, butterflies are a very important part of what makes up the ecosystem. Without them we would not have beautiful flowers, honey, fruit, and many other things that everybody enjoys today.

5

# ECOSYSTEM

Butterflies are a major part in every ecosystem, especially in the ones that have to cross-pollinate to reproduce. Ecosystems are an area where different organisms work together as a unit. They establish a balance over time, this is important because each plant and animal alone could not exist by itself on planet earth. The range of plants butterflies pollinate is called distribution.This explains why there is a great diversity in each ecosystem. Organisms in an ecosystem interact with the sun, soil, water, air and each other.

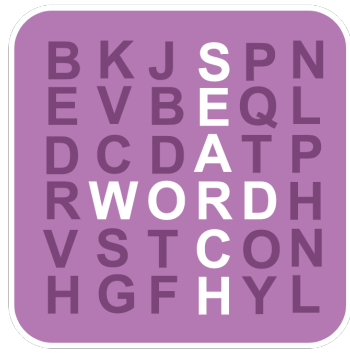
When butterflies pollinate different types of plants they create diversity. If we didn't have butterflies and bees to pollinate for us, people would have to hand-pollinate plants for the beauty of flowers and the great tasting fruits and vegetables we have today. Butterflies role in every ecosystem is to pollinate plants, they pollinate flowers and receive nectar in return for helping the plant.

Butterflies are usually found in prairie biomes. There are two factors in a biome, biotic factor and abiotic factor. In an ecosystem the biotic factors are the plants and animals. A butterfly is a biotic factor because it is living. The rocks, soil, water and temperature of an ecosystem are abiotic factors.

Also, butterflies are part of many food webs and food chains. Every ecosystem has plants and animals that are part of several food chains. A food chain describes how different organisms eat each other. There are four chambers. The first chamber is the producer. It is the host plant, all of the producers have to be plants, seeds, or nuts. The animals in the next chamber eat the producer, this is called a primary consumer. This stage consists of anything that is an herbivore, for example a butterfly. Next the third chamber is the secondary consumer, this chamber eats the animals that are in the lower chambers. The last chamber is a tertiary consumer, it eats all three of the lower categories. When you connect all of the food chains together you end up with a food web. A food web is a pyramid containing producers on the bottom, primary consumers, secondary consumers and one or two tertiary consumers. At the top of the pyramid the predators have many plants, as many as eight. Then the number of consumers as you go up a level decreases by a couple predators. Butterflies are prey to many predators, so if the population of butterflies keeps declining that means that their predators will not have enough food to survive. Most importantly, humans will be in danger. In an ecosystem the animals distribute food so that every animal has a sufficient amount of food.

The predators and diet of a butterfly is very important in an ecosystem. If a butterfly doesn't have a sufficient amount of food that their bodies need or many predators live there it can't survive in that habitat. The predators of butterflies are snakes, toads, birds, and many others. The diet of a butterfly consist of nectar from flowers yet they also eat tree sap, dung, pollen, and rotting fruit. Those are some of the many reasons why butterflies are so important in our ecosystem.

**INTERACTIVE 5.1** Ecosystem WordSearch




*Find all the vocabulary words from this chapter.*

6

# MIGRATION

One of the marvelous breathtaking journeys that Monarch butterflies make is from Canada to Mexico, and then back to Canada again.The fact that Monarchs can make a gigantic journey across North America is truly an unbelievable trip. The Monarch's migration is a very important and interesting part of the Monarch's life span. They travel more than two thousand miles of land. All fourth generation Monarchs must take this journey to survive the cold winter air, but they all take different routes. It takes three generations to make the trip back to Canada, but the

fourth generation is special. The fourth generation of Monarch butterflies start their journey around winter time. They usually take a break somewhere along the border of Nebraska. When they stop, they rest their wings, eat food such as **nectar** or milkweed, and get some well needed rest. Just like we do when we're on a very long car trip. They then start to distribute out towards Mexico again.

The fourth generation lives eight to nine months and travels all the way back to Mexico around winter time all on its own and never leaves again. This is before they lay their eggs and die.When the winter is over, the first, second, and third generation make it back to Canada. This means it takes three butterflies to make it back to Canadian soil. The Monarch's journey is full of dangers ahead of them and many more to come. For example, the pesticides that farmers use to help their crops can be potentially dangerous to Monarchs. While on the way, a butterfly could fly into a spider web and be the spider's next meal. Believe it or not, the climate is also a great danger. If it is too rainy outside, the butterfly will die or fall because its wings are too heavy for them. If it is too hot for the butterfly, it will stop flying. The weather has to be perfect for the butterfly to start the journey again. Nobody really knows how much Monarchs die on this fascinating voyage.There are many wonders about this journey. Mexico is a long ways and it's very amazing how butterflies get a sudden feeling to be somewhere else. Can butterflies tell when to leave? No one really knows for sure what goes on in a butterflies mind. There are many possibilities of how the butterfly knows when and where to go. These beautiful and tiny creatures can do such amazing things that humans can't possibly do.

**INTERACTIVE 6.1** Butterfly Migration Map

*Butterflies travel newly 2,700 miles from Canada to Mexico*


7

# THE FUTURE

How can we rapidly stop the population decline of butterflies? There are numerous ways we can help butterflies thrive, anything can make a difference.

We can create gardens that provide food for these magnificent creatures that are in danger. You can simply help by asking your mayor to plant various gardens in your local parks. These gardens would produce a **nectar source** that butterflies are in great need of. These flowers will soon become **host plants** that will attract many butterflies. Yet you can also plant milkweeds, that would provide a secure place for

butterflies to lay their eggs. In a few weeks you'll see several bright colored butterflies. Not only will it be beautiful, you'll also be aiding in the important survival of these creatures. You can also plant some small trees that will be used efficiently by butterflies, where their pupas will hang on the tree branches. This project would easily increase the butterfly population and restore their natural environment.

You can also tag butterflies, and give scientists a well guessed idea of where butterflies typically migrate to. Scientists are constantly attempting to discover the method butterflies use to migrate to certain locations without ever traveling there. They are born with an instinct to fly to Mexico, mate, lay their egg, and then die.

In addition, your community can take a stand against people who are choosing to destroy the **habitats** of butterflies. For example, the forest butterflies migrate to is called a sanctuary, due to the fact that millions of butterflies migrate to this location every year. Although it is severely illegal to log, loggers are taking the risk. This pertains to the fact that many families depend on the trees for profit. They cut down trees, and people then purchase the wood. However tragic this may be, the government has offered money in condition that they end the non stop logging. Nevertheless, they chose to continue logging. To help protect butterflies be daring and protest against the ways of these people.

Lastly, we can aid butterflies and our own ecosystems by cleaning up parks and doing community service projects. This helps keep our community clean, and also provides a clean place for butterflies to lay their eggs, mate, and create their pupas.

Be willing to lend a hand towards the existence of butterflies. Whatever age you are, don't let that stop your creative ways from doing astonishing things.

# IMAGE ATTRIBUTION

**Book Cover** Picture- Dean Tickle

**Chapter 1:**

Cover Photo- Butterfly by Whologwhy is licensed under CC BY 2.0 source flickr

-Butterfly Classification- by Maddison Sutton

-Summer Azure (Celastrina neglecta) by Andrew C is licensed under CC BY 2.0

-“Summer” Spring Azure by Joshua Mayer is licensed under CC BY-SA 2.0 CC

**Chapter 2:**

Cover Photo-"Tiny Butterfly" by MrClean1982 licensed under CC BY-NC 2.0 source flickr

2.1- Butterfly analogy by Maddison Sutton Butterfly Butterflies Flowers Leaves by Jon Sullivan is licensed under not copyrighted, no rights reserved, royalty free stock photo, source public domain

2.2- Butterfly Analogy by Maddison Sutton Monarch Butterfly by Merlin2525 is licensed under unlimited commercial use, source is Openclipart

2.3- Spot the difference-Lobster Moth - Stauropus fagi-Danny Chapman-Flicker-CC by 2.0 and Photography Peter101, Butterfly in Arizona, Flickr, Attribution-ShareAlike 2.0 Generic, Carly Holbrook

**Chapter 3:**

Cover Photo- Santosh Namby Chandran by White Orange Tip is licensed under CC BY-NC-SA 2.0 source flickr

3.1- Life cycle by Maddison Sutton and Carolyn Zamora

-Be-Jeweled Monarch (Butterfly) Chrysalis by Linda Tanner is licensed under CC BY 2.0

-Proclossiana eunomia egg by Gilles San Martin is licensed under CC BY-SA 2.0

-Monarch Butterfly Spring by Ari Helminen is licensed under CC BY 2.0

-Larva II by Einar Fredriksen is licensed under CC BY-SA 2.0

**Chapter 4:**

Cover Photo-Butterfly by TD Lucas 5000 is licensed under Attribution 2.0 Generic source flickr

4.1- Flower Anatomy Movie

**Chapter 5:**

Cover Photo-A pair of butterflies fluttering together by DSC_0282 Bill Abbott licensed under CC BY-SA 2.0 source flickr

5.1- Ecosystem Word Search, By: Carly Holbrook and Emily Briones

**Chapter 6:**

Cover Photo-Butterflies 09 by Jill Heemstra is licensed under CC BY-NC-SA 2.0 source flickr

6.1- Butterfly Migration Map, By: Carly Holbrook

**Chapter 7:**

Cover Photo-Monarch Butterfly Tagging 2012 by Katja Schulz is licensed under Attribution 2.0 Generic source flickr

# ABOUT THE AUTHORS

This book was a collaborated effort from students in my third period science class. The students each wrote their own chapters then collaborated on the writing, editing and organization of each chapter. The student listed first was the editor of the chapter, followed by the the contributing authors for that chapter.

***Introduction:***

*Eli Young, Maddison Sutton, Carly Holbrook, Gabriela Ramirez, Alexis Hernandez, Rene Rivas*

***Chapter 1:***

*Dakota Welch, Alexis Hernandez, Gabriela Ramirez, Katty Escobar*

***Chapter 2:***

*Carolyn Zamora, Simon Rivas, Rene Rivas, Carly Holbrook, Gabriela Ramirez, Dakota Welch, Emily Briones*

***Chapter 3:***

*Damian Salinas, Nomar Sandoval, Gabriela Ramirez, Katty Escobar, Carolyn Zamora*

***Chapter 4:***

*Carly Holbrook, Gabriela Ramirez, Dakota Welch, Carolyn Zamora, Emily Briones*

***Chapter 5:***

*Maddison Sutton, Simon Rivas, Alexis Hernandez, Nallely Martinez-Ortiz, Gabriela Ramirez, Katty Escobar, Carolyn Zamora, Emily Briones*

***Chapter 6:***

*Gabriela Ramirez, Madison Sutton, Damian Salinas,Carly Holbrook, Manuel Juarez, Eli Young*

***Chapter 7:***

*Emily Briones, Simon Rivas, Madison Sutton, Damian Salinas, Gabriela Ramirez , Dakota Welch, Carolyn Zamora*

# Abdomen

The most posterior, near the bottom, portion of the three segments of a

**Related Glossary Terms**

Drag related terms here

**Index** Find Term

**Chapter 2 - Anatomy**

# Antenna

Specialized, segmented, receptive, sensory organs found on the head o

## Related Glossary Terms

Drag related terms here

## Index

Find Term

# Anther

The part of the flower (specifically found on the stamen) that houses po

**Related Glossary Terms**

Drag related terms here

# Arachnids

Any member of the class Arachnida, which have two-segmented bodies
of legs, and no antennae.

**Related Glossary Terms**

Drag related terms here

# Binomial nomenclature

The system of assigning scientific names to organisms.

**Related Glossary Terms**

Drag related terms here

# Cross pollination

The transfer of pollen from the flower of one plant to another.

**Related Glossary Terms**

Drag related terms here

# Dichotomous key

A key used to identify organisms. The user goes through a series of des
that narrow down possible species until the organism is identified.

**Related Glossary Terms**

Drag related terms here

# Diversity

The state of being different.

## Related Glossary Terms

Drag related terms here

# Family

The major subdivision of an order when classifying organisms, which u
contain several genera.

**Related Glossary Terms**

Drag related terms here

# Forewings

Either of the two front wings of a four-winged insect.

**Related Glossary Terms**

Drag related terms here

# Genus

A principal taxonomic category that ranks above species and below fan

**Related Glossary Terms**

Drag related terms here

# Habitats

The natural environment of an organism or the type of location where
generally found.

**Related Glossary Terms**

Drag related terms here

# Head

The most superior segment of an insect, containing the antennae and c
cranial organs.

**Related Glossary Terms**

Drag related terms here

# Hindwings

Either of the two back wings of a four-winged insect.

---

**Related Glossary Terms**

Drag related terms here

# Host plants

The specific plant that the larvae of an insect may use as a food source site.

**Related Glossary Terms**

Drag related terms here

# Insects

Any member of class Insecta, which has six segmented legs, three body
one or two pairs of wings.

**Related Glossary Terms**

Drag related terms here

# Lepidopterist

A person who studies butterflies and/or moths.

## Related Glossary Terms

Drag related terms here

# Nectar

The sugary fluid produced by some plants that helps attract pollinating
and other animals.

**Related Glossary Terms**

Drag related terms here

# Nectar source

A flowering plant that produces nectar (a sugary liquid that often attra
ing insects and other animals).

**Related Glossary Terms**

Drag related terms here

# Pistil

The female organ of a flower, which is made-up of a stigma, style, and

**Related Glossary Terms**

Drag related terms here

# Pollen

Microscopic grains produced by the male reproductive organs (anthers
plants that are used to carry male reproductive cells in order to fertilize
male reproductive organs (pistils) of plants of the same species.

**Related Glossary Terms**

Drag related terms here

# Pollination

The depositing of pollen in order to allow for fertilization.

**Related Glossary Terms**

Drag related terms here

# Self-pollination

The transfer of pollen from the flower of one plant to either the same fl
other flower on that same host plant.

**Related Glossary Terms**

Drag related terms here

# Species

A group of living organisms consisting of similar individuals capable of
The species is the principal natural taxonomic unit, ranking below a ge

**Related Glossary Terms**

Drag related terms here

# Stamen

The male, pollen-producing reproductive organ of a flower.

---

**Related Glossary Terms**

Drag related terms here

# Stigma

The receptacle for pollen, found at the top of most pistils (the female re
organs of plants).

**Related Glossary Terms**

Drag related terms here

# Style

The portion of the pistil (the female reproductive organs of plants) that
pollen from the stigma to the ovary.

**Related Glossary Terms**

Drag related terms here

# Taxonomy

The science of naming organisms. The process of classifying animals in
based on similar features and genetics.

**Related Glossary Terms**

Drag related terms here

# Thorax

The middle portion of the three segments of an insect.

**Related Glossary Terms**

Drag related terms here